

**B.Sc. 5th Semester (Honours) Examination, 2019 (CBCS)****Subject : Chemistry****Paper : DSE-II (OR)****(Instrumental Methods of Chemical Analysis)****Time: 2 Hours****Full Marks: 40***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer *any five* questions: 2×5=10
- (a) Explain  $CS_2$  in a convenient solvent for use with Flame Ionization Detector (FID) in Gas Chromatography (GC).
  - (b) Elucidate Thin Layer Electrophoresis (TLE).
  - (c) State the difference between single and double beam spectrophotometer.
  - (d) What is a photomultiplier tube used in UV-Vis spectrophotometry?
  - (e) Name the detectors used in X-ray spectroscopy.
  - (f) Explain: The accuracy and quality of an NMR instrument depends upon the strength of the magnet.
  - (g) How is DNA detected after gel electrophoresis?
  - (h) Write down the source in the instrumentation for Electron Spectroscopy.
2. Answer *any two* questions: 5×2=10
- (a) (i) What are the advantages of carbon  $^{13}C$  — NMR over proton NMR?  
(ii) Why the graphite tube cannot be used immediately after the operation in Atomic Absorption Spectrometry (AAS)? 2½+2½=5
  - (b) (i) Explain the working principles of Atomic Absorption Spectrometry (AAS) and Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES).  
(ii) Name the fuels used in flame photometry. (2+2)+1=5
  - (c) (i) What are the limitations of the IR technique in quantitative analysis?  
(ii) Name the electrodes used in potentiometry citing one example for each. 2+3=5
  - (d) (i) Explain with neat sketch and suitable example, the application and theory of Mass Spectroscopy.  
(ii) What is cyclic voltammetry? 4+1=5

3. Answer any two questions:

10×2=20

- (a) (i) Explain Column is the heart of Gas Chromatography (GC).  
(ii) Explain the colour change of dichromate ion on dilution with water.  
(iii) What are the different sources used in X-ray spectroscopy. 3+4+3=10
- (b) (i) Give an account of Flameless Atomic Absorption Spectrometry for monitoring of Hg.  
(ii) What are the criteria of the pump used in High Performance Liquid Chromatography (HPLC)?  
(iii) What are the sources of radiation in UV-VIS spectrophotometer? 4+3+3=10
- (c) (i) Why pyrolytic graphite tubes are used in Graphite Furnace Atomic Absorption Spectrometry (GFAAS)?  
(ii) Write down the special features of IR instrument.  
(iii) What are the advantages of supercritical fluid chromatography over GC and HPLC? 3+3+4=10
- (d) (i) What is background absorption? How can you eliminate it?  
(ii) What are the factors affecting electrophoresis? (3+3)+4=10
-